BRÜCK 09/601846
53 Rec'd PCT/PTC 04 AUG 2000

WO 99/39931 TRANSLATION of PCT/EP99/00750

Internal element for a door

A FIELD AND BACKGROUND OF THE INVENTION

The invention relates to an internal element for a door for motor vehicle doors, to be arranged between a door outer side and an inner lining, and a sealing body being disposed at the edge.

A door internal element of this type which is incorporated in the motor vehicle door is support for numerous functional parts and their securing elements. Generally, the door internal element is made from sheet steel. Depending on the basic design, this makes such supports too heavy. Moreover, there is outlay involved in sealing apertures. Finally, the forming options are limited. Alternatively, door internal elements made from plastics materials have been used as supports for door components. Apart from a reduction in weight, this choice faces problems relating to the acoustic function; there is no significant insulation or damping. This solution is also unsatisfactory in terms of providing a water barrier. To compensate for deficiencies of this nature, it is necessary to rely on additional elements such as film or foil, damping sheets, etc.

A7 SUMMARY OF THE INVENTION

It is an object of the invention to provide a door internal element which is advantageous in use and is simple in terms of the production engineering required.

This object is achieved first and foremost by a door internal element in accordance with the features of Claim 1 in which it is provided that, during production using the foam injection process, a sealing body is fitted at the edge.

a As a result of ~~such a design,~~ the invention there is achieved a door internal element of the generic type which is easier to

produce and is highly functional in use. Support function and sealing function are combined on a single body of considerably reduced weight. There are improved forming options. The resultant multidirectionality of the substantially sheet-like door internal element makes it stiffer. The vitreous skin formation which is a specific characteristic of the foam injection process constitutes a further stability factor. This is supplemented by good insulation and damping properties. The transition to the door structural part which supports the door internal element, for example a frame-like door interior plate, is very well implemented, specifically also in terms of its sealing function, by the sealing body on the edge. Because of the foam injection formation of the door internal element, there are provided the best possible conditions for the sealing body which can be adhesively bonded in the skin of the foam injection-formed body. This is an elastomer seal which is moulded directly onto the foam injection-formed body and is thus anchored securely in the relatively thin, skin-like layer of the foam injection-formed body. The moulding temperature of the elastomer material is sufficient to cause the skin-like layer of the foam injection-formed body to deflect so that the elastomer material, i.e. the sealing body, can be held therein without any gaps whatsoever. On the other hand, there is also no damage caused to the foam injection-formed body by this. To increase the pliability, the sealing body may have a continuous cavity. This not only reduces the weight, but also saves on material. Further details can be found in DE 295 11 492 ~~U~~ which is not a prior publication, and EP ... (Application No. 97115150.1). These documents are hereby incorporated IN ~~as to~~ their entirety ~~full content~~, also for the purpose of including features of these documents in claims of the present application. Furthermore, it has proven advantageous for cable holders to be moulded onto the door internal

element. Such measures substitute for the corresponding conventional holder means. Furthermore, it is proposed for a mounting collar be moulded on, for holding a loudspeaker. By reinforcing the edge of the corresponding hole, this collar forms a sufficiently secure base for attachment means, such as for example screws, and, at the same time, a sealed transition point. Furthermore, it has proven advantageous for a cable bushing to be moulded out. In order, in this case, to ensure that there is a seal between the cable cord and the cable bushing, the cable bushing has an edging made from soft plastics (TPE). Here too, it is possible, in the same way, to form an elastomer seal with a cavity, so that an extremely elastic annular membrane is provided. Even for the securing elements, such as screws, etc., a corresponding measure is taken into account on the door internal element, in that the door internal element has a moulded-in bush. This is generally a bush which has an internal screw thread. Like the mounting collar explained above, this bush may consist of harder, solid plastics material. Naturally, elements such as the cable bushings and the bush are provided in large numbers taking into account the specific basic design. Furthermore, it is proposed for the door internal element to have an inserted support plate for mounting a motor. Expediently, such a plate is made from metal. It may already be set up for the specific fitting arrangement, i.e. have matching securing holes or clip projections for fixing the baseplate of the motor to a support plate of this type. Finally, it is proposed for the door internal element to have bridges which are moulded on by the foam injection technique and the undersides of which are exposed. It is possible to thread elements behind such loop-like structures, either for the passage of cables or even for the passage of a Bowden cable. Finally, a solution which also offers stability is achieved by means of a partial wall offset in the door internal

element as a laying path for strip-like inserts. This may be used, for example, to hold a steel insert.

Furthermore, the invention proposes that the sealing body be formed as a bead which is applied to a wide face of the door internal element. This can be fitted accurately using a robot. The result is that the materials bond automatically to one another, if appropriate partly by utilizing the heat which is still present in the foam injection-formed body. It is expedient for the sealing body to be located in an integrally formed groove. To ensure that the latter does not form a weak point, the groove is formed by means of a wall offset so as to mould out a foam injection-formed bead on the rear side, that is to say the other wide face. It is thus possible, by way of example, for the object in question to have an overall thickness of only approx. 5 mm. The groove-forming change in direction of the material of the foam injection-formed body even provides increased stability. In this respect, the bead is actually a stabilizing rib. The component is made highly stable if the density of the door internal element varies over a cross section, that is to say is between 0.7 and 1.4 g/cm^3 in an unfoamed boundary zone and is between 0.1 and 0.6 g/cm^3 in the foamed central layer. The density of compact polymer materials is approx. 1 g/cm^3. By means of such a sandwiched structure it is possible to produce components with relatively high stiffness, low weight and great integration potential. Furthermore, it is provided for the foam injection-formed material to contain a proportion of an HMS (High Melt Strength) polymer which is based on PP. This increases the melt stability of the copolymer. The base component itself is approx. 90%. By this structurally isomeric propylene polymer, the processing window is widened and stable cell growth with uniform cell size is produced. There is provided a structure which is as

far as possible homogeneous. Furthermore, it is proposed for the foam injection-formed material to contain fillers or reinforcing substances. Such substances further increase the stiffness of the lightweight components. They may involve adding approx. 20% glass fibres or talc. Furthermore, it is proposed for anchoring apertures to be provided at the end face, which anchoring apertures have a solid hole lining lying in the direction of the aperture as a result of integral moulding-out. At both ends, a sleeve web of this type adjoins the solid boundary layers of the door internal element which lie transversely with respect thereto. The hole lining reinforces the zone, so that securing elements which pass through, such as for example self-tapping screws, etc., clips or the like are subjected to sufficient resistance despite the low density. Furthermore, in this context it is proven advantageous for an anchoring aperture to be surrounded by an integrally foamed tab section which projects from the end face. Such tabs increase the area surrounding the hole and provide more "meat". Furthermore, it is also possible to provide measures which involve incorporating bushes, threaded inserts, etc. in the door internal element by injection moulding around them. They may be metal inserts. One arrangement of even independent importance consists in removing some of the material by milling or cutting, not all the way through, in the door internal element on the wide face, so as to provide access to the lower-density central layer. In so doing, the freedom from apertures of the door internal element is maintained. Only one of the solid boundary layers is provided with a window by which there is provided the desired access for a securing element. This can be embodied in concrete form by the exposed regions of the central layer serving as access for anchoring means. Finally, as an independently significant solution, it is proposed for clips to be secured in the door internal element,

A BRIEF DESCRIPTION OF THE DRAWINGS

leaving the integral outer skin. These elements may be rotary anchors which can be countersunk in suitable centre-oriented trenches and the star-shaped anchor arms of which cut into the trench flanks.

The subject-matter of the invention is explained in more detail below with reference to an exemplary embodiment which is illustrated in the drawings in which:

Fig. 1 shows the door internal element in side view,

Fig. 2 shows a section through a vehicle door with incorporated door internal element,

Fig. 3 shows an enlarged excerpt III-III from Fig. 2, showing the edge-side sealing body between door internal element and a door interior plate of the door,

Fig. 4 shows the section on line IV-IV in Figure 1, showing a cable holder,

Fig. 5 shows the section on line V-V in Figure 1, showing a cable bushing with guide collar,

Fig. 6 shows the section on line VI-VI in Figure 1, illustrating a cable bushing with edging,

Fig. 7 shows the section on line VII-VII in Figure 1, illustrating a moulded-in bush,

Fig. 8 shows the section on line VIII-VIII in Figure 1, illustrating a moulded-in mounting collar with a loudspeaker shown in dot-dashed lines,

Fig. 9 shows the section on line IX-IX in Figure 1, illustrating a support plate for mounting a motor,

Fig. 10 shows the section on line X-X in Figure 1, embodying a bridge zone for holding a Bowden cable, for example,

Fig. 11 shows a side view of a variant of the door internal element,

Fig. 12 shows an end view of this,

Fig. 13 shows the section on line XIII-XIII in Fig. 11, on an enlarged scale, illustrating the arrangement of the sealing body and the formation of an anchoring aperture,

Fig. 14 shows the section on line XIV-XIV in Fig. 11, once again on an enlarged scale and showing the peripheral end face, specifically as a continuation of the solid boundary layer,

Fig. 15 shows a region on the door internal element which has a thicker central layer, for example offering "meat" for screw connections,

Fig. 16 shows a cross section through the door internal element, forming an anchoring zone,

Fig. 17 shows the associated anchoring means,

Fig. 18 shows a plan view of Fig. 16, with correct orientation of the anchoring means, prior to anchoring,

Fig. 19 shows a section corresponding to Fig. 16 with the anchoring means correctly in its operating position,

Fig. 20 shows a section through the door internal element, on a further enlarged scale,

Fig. 21 shows an illustration corresponding to Fig. 16, using a material-removing operation in order to provide securing accessibility for the anchoring means,

Fig. 22 shows the same, with the anchoring means correctly in its operating position, and

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Fig. 23 shows a plan view of Fig. 22 with the anchoring illustrated in dot-dashed lines.

A DETAILED DESCRIPTION OF THE PREFERRED EMBODIMENT

The motor vehicle door 1 which is illustrated in vertical section in Figure 2 accommodates a door internal element 3 in its cavity 2. When the door is fitted, this internal element extends substantially vertically.

The door internal element 3 is associated with the opening 4 of a frame-like door interior plate 5. It completely closes this opening 4 and, at the same time, seals it.

The door outer panel which closes off the cavity 2 on the outside is denoted by 6.

A lining 7 which closes off the cavity 2 on the passenger compartment side forms a closure on that side. This lining may cover an inlay 8 which is located on this side and is known as padding.

The edge of the opening 4 is formed as a step 9 towards the outer side of the door, forming a continuously encircling bearing shoulder 10, on which the periphery of the door internal element 3 is fully supported. This edge carries the reference numeral 11.

The support is effected with interposition of a sealing body 12. This sealing body is moulded uniformly on the edge of the door internal element 3 during production in the foam injection process. The sealing action with respect to the bearing shoulder 10 which follows the contours is increased by forming a cavity 13 in that section of the sealing body 12 which is active in terms of the sealing function. The sealing body is an elastomer seal with a continuous cavity 13. The cavity 13 is produced in the gas injection process which takes place simultaneously. The required fluid can be supplied via one or more cannulas, the puncture holes of which can close up automatically.

The securing foot 14, which faces the edge 11, of the sealing body 12 engages over the corner zone, facing the door outer side, of the edge 11. Naturally, that section of the securing foot 14, which is in this case angular, which goes beyond the end can cover the entire end face 15 of the edge 11 or be anchored. As the enlarged illustration Figure 3 shows, there is then a skin-like layer 16 which covers the entire contact zone. The elastomer material does not penetrate through this zone. The zone forms, at it were, an adhesion layer.

With regard to the door module, i.e. door internal element 3, the following materials can be used: PP, PA, ABS or PET and foaming agent (endothermic or exothermic) for foaming. The material is foamed to approx. 50% of its initial density. The door internal element 3 acquires its final form and finish in a

single foaming operation, as explained in more detail below. Suitable materials for the sealing body 12 are: TPE (TPE-V or SEBS). This material is also used for the apertures explained below.

A door internal element 3 which is produced, for example, by two-colour injection moulding is best able to utilize the advantages of a forming process. It is possible to produce complex geometries and changes in wall thickness and, at the same time, to associate further elements. The door internal element 3 is lightweight, stable and insulating or damping.

Cable holders 17 are moulded on the door internal element 3. The cable is denoted by 18 (cf. Figure 4). In specific terms, these are two freely projecting, spring-like limbs 19 which project transversely out of the general plane of the door internal element 3. The limb root widens towards the panel body. The transversely open insertion opening 20 of the cable holder 17 has a slight undercut, resulting in an excellent clip-style holder.

Sub D7

Figure 5 shows an arrangement in which the cable 18, rather than running supported on the element, runs through the panel body. For this purpose, a cable bushing 21 is produced, comprising a hole 22 in the panel body and a curved sealing connection piece 23 which narrows towards its free end, down to the cross-sectional dimension of the cable 18 or even less than this dimension, so that a seal is formed. The sealing connection piece 23 may consist of the same material as the sealing body 12. Moulding onto the outer side of the door internal element 3, which outer side is vitrified or has a hard skin, is optimum, in this case also with anchoring in a skin-like layer 16. Instead of adopting a curved shape there illustrated, the sealing connection piece 23 can also stand at right angles to

D1

the general plane of the door internal element 3, and then, if appropriate, be bent into any desired direction of run of the cable 18.

Sub D17

The cable bushing 21 illustrated in Figure 6 dispenses with a freely projecting design in the form of a connection piece or nozzle in favour of lining the hole 22 which is present in that region over the thickness of the element 1. In this case, the cable bushing 21 is formed by an edging 24 made from soft plastics material, suitably using the material employed for the sealing body 12, specifically under identical bonding conditions to those explained in that connection. An encircling cavity 25 is also considered. In practice, there is a hole-filling annular membrane, the central opening of which, as a result of the cable 18 being inserted, engages tightly against the said cable.

From Figure 7, it can be seen how a bush 26 is fitted in terms of the moulding technology used. There is in question a bush 26 which has an internal screw thread 27 for a screw, the screw having a corresponding external screw thread, as securing element 28. The said bush 26 extends transversely with respect to the general plane of the door internal element 3, specifically lying in a trapezium-shaped geometry 29. It (26) has its roots in the narrower end face of the trapezium and projects into the channel space 30 which is produced by the wall offset and the length of which towards the outside is not exceeded by the length of the securing element 28. Rather, the free end edge of the bush 26 is flush with the left-hand outer side of the door internal element 3.

Sub D27

Figure 8 illustrates a holding collar 31, which is used to flange on a loudspeaker 32, illustrated in dot-dashed lines. The loudspeaker has a mounting flange 33. The dimensions of the loudspeaker 32 itself are adapted

so that its edges can be supported on the exposed holding collar 38. The holding collar 31 may be made from hard PVC.

The exposed position of the holding collar 31, which is in this case in the form of a ring, is based on a frustoconical geometry 34 of a section of the door internal element 3 in the vicinity of the edge. The holding collar 31 is rectangular or, if appropriate, even square in cross section. Its outer edge which faces towards the panel body of the door internal element 3 is embedded, specifically over the entire width of the ring cross section in the direction parallel to the panel and over half the ring thickness in the transverse direction. The same bonding effects as those described above are present here. The hole 35, which is enclosed in stable manner, in the door internal element 3 thus ends in the same plane as the inner side of the holding collar 31.

The wall offset, which is in this case of rotationally symmetrical design, for creating the frustoconical geometry 34, stabilizes the area surrounding the holding collar 31.

A further configuration is shown in Figure 9, and specifically, in that figure, a part is once again arranged in an offset-plane zone of the panel body of the door internal element 3. This part is in this case an inserted support plate 36, which forms a stable supporting base for a motor 37 which is illustrated in dot-dashed lines. The wall offset, which runs to the right in Figure 9, of the panel body of the door internal element 3 is denoted by 38. It takes into account a recess 39 which corresponds to the panel contour. This leaves an edge shoulder 40 in the exposed region. This shoulder ends in front of a window-like

aperture 41, so that the motor 37 experiences excellent edge support at 42.

The support plate 36 illustrated has male protrusions 43 which engage behind a female opening 44 by snap action. The result may be an irreversible snap connection. The male protrusions 43 are mushroom-shaped hook elements which snap behind shoulders of the female opening.

The support plate 36 may be a metal plate.

Referring now to Figure 10, there is illustrated a bridge 45 which is formed on the door internal element 3 by injection moulding. The underside 46 of the bridge is exposed. The bridge consists of cut-free loops which are pressed out of the general plane of the panel. They leave clear an eyelet 47, for a cable or, as shown in Figure 10, a Bowden cable 48, to be threaded through, for example. The corresponding structure of cuts can be seen in Figure 1, specifically in the region of the section indicator X-X from this figure.

The bridge underside 46, which is illustrated as an internal elbow with falling slopes, may also have lugs for laterally supporting the Bowden cable 48 (not shown).

If necessary, the recess portion which is not occupied by the cross section of the Bowden cable 48 can be closed off on both sides by sealing compound.

Finally, as can be gathered from Figure 2, a wall offset 49 is provided at that location in the central region. This offset is on the passenger compartment side of the vehicle door 1. In this way, a laying path 50 is formed on the door internal element 3, for example for incorporating a stabilizing element in the

form of a strip-like insert 51 made from steel. The laying path is a channel which has a trapezium-shaped cross section.

This and other highly reinforced parts, such as also the support plate 36, form a good base for the installation of window crank handle fittings and their spindles, lifters, etc.

The door internal element 3 may be screwed to the bearing shoulder 10. An adhesive bond can also be used.

The variant of the door internal element 3 which is illustrated from Fig. 11 onwards likewise consists of foam injection-formed material. Material from the large group of the thermoplastics is used. This group includes, for example, PP, PA, ABS, PET, PC+, PBT, etc. To achieve specific materials properties, two PP grades are combined with one another. The base component, up to approx. 90%, in this case comprises a copolymer. Generally, the block copolymers containing lower α-olefins, preferably ethylene, have better impact strength. To increase the melt stability of the copolymers, an HMS (High Melt Strength) polymer based on PP is admixed with the base component. By virtue of this structurally isomeric propylene polymer, the processing window is widened and stable cell growth with a uniform cell size is produced.

Furthermore, fillers and/or reinforcing substances, i.e. the polymer materials, are admixed with the foam injection-formed material. These fillers and/or reinforcing substances are up to 20% glass fibres or talc. The rigidity of the component is increased by these reinforcing substances.

The sandwich-like structure of the spray-foamed component which is the basis of this door internal

element 3 is based on planes of different densities, which in concrete terms means that the density of the door internal element 3 over a cross section in the immediate vicinity of an unfoamed boundary layer 52 is between 0.7 and 1.4 g/cm^3. Boundary layer 52 means the regions taken up by the wide faces of the component and not the end face, which is referred to in the text above by 15, although this itself is also closed there by an extension of the boundary layer 52. This end layer, that is to say the peripheral hinterland of the end face 15, is denoted by the reference numeral 53. The density of the core of the door internal element 3 which is enclosed by the two solid boundary layers 52 and the encircling end layer 53, which core in the present case is in the form of a foamed, porous central layer 54, by contrast is from 0.1 to 0.6 g/cm^3.

The foam structure of the thermoplastic foamed body has a surprisingly high homogeneity, which towards the solid boundary layer 52 ends virtually in the form of a boundary surface, so that the desired peripheral hard shell is in this case closed on all sides.

While the solid boundary layer 52, including the end layer 53 of course, cannot readily be penetrated, the tightly encapsulated, porous central layer 54 can be punctured or cut through, that is to say penetrated, using relatively moderate forces. The benefit to be derived from this is explained in more detail below.

The desired high modulus of elasticity of the boundary layers is achieved even if they form a relatively small proportion of the thickness. For example, even boundary layer thicknesses of 0.4 and 0.7 mm are sufficient in this regard for an overall component thickness of approx. 5 mm. The values for the strength for such boundary layers 52 are in the vicinity of 2500 N/mm^2. At

the central layer 54, on the other hand, it falls away to a value of just 600 N/mm^2.

All this constitutes the basis for problem free supporting equipping with the standard components accommodated in the vehicle door 1, such as loudspeaker, loudspeaker box, cable holder 17, cable 18, to name but a few.

With regard to the sealing body 12, the latter is now laid as a robot-controlled track on the door internal element 3. For this purpose, the sealing body 12 is formed as a closed-end bead which is applied to a wide face 55 of the door internal element 3. This bead is a foamed body with an integrally formed, highly elastic skin 56. Reference is made to Fig. 13, in which the skin 56 is illustrated as a simple boundary line. To provide good anchoring for the sealing body 12, its body, which is in this case mushroom-shaped in cross section, extends in such a way that its foot reaches into a groove 57 which starts from the wide face 55. This groove is also taken into account in the foam injection process. The groove is formed by the boundary layer 52 of the component which is located on this side, that is to say the wide face 55. The flanks and base of the groove 57 are therefore stable and remain supported by the core of the foamed body, which is itself reasonably strong, i.e. the central layer 54.

The most stable conditions are present in the region where the sealing body 12 is laid, since the groove 57 is formed by a wall offset. There is therefore no reduction in the thickness of the component. Rather, the wall offset forms a bead 58 which is located on the rear side, that is to say the other wide face 59, of the door internal element 3.

It can be seen that the bead 58 has a width which significantly exceeds the clear width of the groove 57. The ratio is approximately 1:2.

The height of the bead 58 is continuous, only leaving this plane when the corresponding stop face, formed by the bearing shoulder 10 of the step 9 of the door interior plate 5 of the motor vehicle door 1, differs in this respect. The depth of the groove 57 is precisely such that the base formed by the depressed solid boundary layer 52 lies substantially in the same plane as the boundary layer 52 which is located on the rear side.

The anchoring of the foot of the sealing body 12 is promoted by the adhesive force of the contact surfaces. There is, as it were, a thermoplastic bonding of the sealing body 12 which consists of soft foam.

Sub B3

Figure 13, which illustrates the arrangement of the sealing body described above, in combination with Fig. 11, shows a particular arrangement of holes for securing elements to engage through. In the region of the section indicator XIII-XIII, Fig. 11 shows how anchoring apertures 60 are formed at the end face, distributed irregularly over the periphery of the door internal element 3. Although they could be perforations or laser incisions, the apertures 60 illustrated are formed during the course of the foam injection process. The interior of the apertures 60 (cf. also Fig. 13) is therefore subjected to the same hard skin-forming conditions as those outlined in relation to the boundary layers 52 and the end layer 53, in other words: the anchoring protrusions 60 which are produced by being moulded integrally acquire a solid, stabilizing hole lining 61. This is, as it were, formed as a sleeve-like section and constitutes a fixed material bridge, in the form of a tubular rivet,

between the two boundary layers 52 which are spaced apart from one another by the central layer 54. The transition edges are rounded with a transverse convexity. In this way, the component is not squeezed together when a fastening element, such as for example a screw, is screwed in, or is not so easily squeezed together in the event of excessive force being used. Rather, a spring-loading action is formed by the restoring force. This contributes to securing the fastening. The said anchoring apertures 60 form layer-joining anchors with an extremely good stabilizing action. Due to the close proximity to the groove 57, the stabilizing action even extends to the mounting zone for the sealing body 12. There comes about also a mutual stabilizing of the entire periphery of the foam injection-formed body.

As can also be gathered from Fig. 11, an anchoring aperture 60 is surrounded by a tab section 62 which projects from an end face and is likewise foamed on integrally. Such tab sections 62 stand outwardly-directed. They may be semicircular or trapezium-shaped jutting-out flange tabs, which provide an area which is sufficiently large for the axis point of the anchoring apertures 60, which are generally round in terms of the hole contour, to be flush with the end face 15 of the door internal element 3. Such anchoring apertures 60 or even other apertures in the overall area of the door internal element 3 are, in this case also, provided with the standard bushes, threaded inserts, etc., preferably by incorporating such elements by injection moulding around them. In this respect, there are considerable variations with respect to the basic version.

Fig. 15 shows yet another detail of the door internal element 3 in that there is there a noticeable build-up of material 63 on the wide face 59, i.e. the rear side

of the door internal element 3, in order to create sufficient screw-in depth for securing elements not to project freely in the direction in which they are arranged. The boundary layer 52 circumscribes the corresponding bulge in a dome-like configuration. By contrast, the boundary layer 52 on the other side continues in plane-parallel manner. Partial build-ups of material of this type are also employed with regard to the basic version and explained therein. Reference is made to Figures 4 and 9, although these figures relate to the provision of satisfactory anchoring for the support plate 36 on an edge shoulder 40, the inner region of which has a thicker cross section towards 39 than the remaining thickness of the substantially flat door internal element 2.

While continuous anchoring apertures 60 are in principle made only outside the boundaries of the sealing body 12, anchoring apertures which are not through apertures are formed in the inner area of the door internal element 3 which is surrounded by the sealing body 12. Consequently, the partition-like sealing action of the door internal element 3 is fully retained. There is no possibility of moisture passing through.

The positioning of suitable anchoring means 64, which may be cable holders, Bowden cable guides, etc., is achieved in two different ways. One consists in removing some of the material by milling on the wide face side of the door internal element 3. This situation is illustrated in Figs 21 to 23. The reference numerals, where they have already been explained above, are adopted accordingly, in some cases without repeating the corresponding text. During the foam injection operation, a depression which reaches into the central layer 54 is generated from the desired wide face. As can be seen from Figs 21 and 23, this

depression is a slot-like trough 65 which extends as far as just in front of the solid boundary layer 52 which lies on the underside in Fig. 21, so that there is still some of the foam structure of the central section 54 in place. By introducing a milling cutter (not shown), the oval trough wall 66, which is oriented transversely with respect to the general direction of extent of the door internal element 3, is milled away. A suitable anchoring means the 64 is introduced, and the desired anchoring is present once the means 64 has been inserted and turned. The turning is effected by very moderate forces, since access to the porous central layer 54 of lower density has been provided by the milling cutter.

The anchor 67 which enters or penetrates into this structure is at the same time the blade 67′ which acts plane-parallel to the direction of extent of the door internal element 3. The blade back may have a projecting barb 68 which blocks the anchor 67 from turning back.

If it is desired to provide a greater penetration depth for the anchor 67, it is possible to effect a partial thickening of the foam material, as shown in Fig. 21, by forming the build-up of material 63 discussed above, through outwardly-directed displacement of the boundary layer 52 which is remote from the installation side with respect to the trough 65.

In Figs 21 to 23, the anchoring means 64 is an item which has only one anchor.

The situation illustrated in Figs 17 to 20 is different, embodying the other form of anchoring means arrangement. In this arrangement, the trough 65 is in the form of a Maltese cross. It is, as it were, a cross-shaped trough. In this case, however, there is no

machining involved. The trough 65 remains as originally formed. Rather, the procedure in this case is that anchoring means 64 which are formed, for example, in the shape of a clip, are secured in the door internal element 3 while retaining the integral outer skin. This means that neither the access-side boundary layer 62 is abraded in the vicinity of the trough, nor is the trough wall 66 abraded. The suitably designed anchor is likewise in the form of a cross. Its four anchors 67 or blades 67', which are located distributed at regular angular intervals, engage beneath the remaining parts 69 of the foamed body which have been left in place, so that they themselves cut open the path through the trough wall 66. The restoring force of the trough wall 66 even manages to at least partially close the entrance to the cut. In this case too, the barb 68 projecting transversely from the anchor 67 is provided. The overall result is a centre-oriented system of trenches for the self-tapping entry of the side flanks of the cross-shaped rotary anchor of the anchoring means.

The pedestal 70 of the cross-shaped anchor 67, which starts from the plane of the anchor 67 and projects beyond the edge of the trough, is not round on its lateral wall side, making it easier to fit the anchoring means 64 by attaching a rotary tool. The non-round cross section may even be hexagonal, so that it is possible to use spanners.

There is no need for the pedestal 70 to be integral with a coaxially adjoining clip 71. The flattened clip 71 is therefore not used as an actuating handle. It is rotationally connected to the pedestal 70. This also has the advantage that the clip 71 is easy to align with respect to the object which is to be clamped, such as for example a Bowden cable. The position or rotary

end position of the pedestal 70 is therefore insignificant in terms of its rotational angle.

All features disclosed are pertinent to the invention. In the disclosure of the application, there is hereby incorporated the disclosure content of the associated/appended priority documents (copy of the prior application) as to its full content, also for the purpose of incorporating features of these documents in claims of the present application.